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HOWARD GARDNER Project Zero: an Introduction to *Arts Propel*

Any long-term participant in arts education, especially in the United States of America, should take some pleasure in the recently-acquired notoriety of our field. Supported primarily by the Getty Center, the national Endowment of the Arts, and various federal and private philanthropies, arts education is now an unmistakable participant in national conversations about educational reform. Such an opportunity is unlikely to arise more than once in a generation, and we should seize it.

At the rhetorical level it is easy to find areas of consensus among the participants in the rebirth of a national arts education movement. Nearly all individuals would call for more class time spent on the arts and for better trained teachers. Yet lurking beneath the surface agreement there are vexed issues which engender sharp controversy [1]. Some of the questions seem practical in nature. Should we call for specialist teachers or train generalists? Should we focus on one or two art forms or provide the whole menu of genres and forms? Should we have a uniform curriculum across cities or states? Should we employ standardized tests? But one soon encounters issues which exceed the 'merely

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practical'. To what extent should art classes be used to foster creativity? Should art be taught separately or infused across the curriculum? Is there a privileged canon of Western art, or does the art of *our* civilization merely take its place among many other equally-meritorious traditions? Should art training focus on the productive skills, or should there be a heightened emphasis on connoisseurship? Is artistic knowledge primarily factual or does it involve unique forms of cognition and meta-cognition?

None of these questions is new, but they take on special significance at a time when major new resources are being directed at educational efforts in the schools, in museums, and even on television. Decisions made (or avoided) are likely to have reverberations for a decade or more. *Arts Propel*, an outcome of Project Zero, is one of our contributions to this national debate.

Intellectual roots of Project Zero

Project Zero was founded in 1967 at the Harvard Graduate School of Education by the noted philosopher Nelson Goodman. An epistemologist by training, Goodman challenged the widespread notion that linguistic and logical symbol systems had priority over other expressive and communicative systems. Instead, following earlier attempts by Charles Sanders Pierce [2], Ernst Cassirer [3], and Susanne Langer [4], Goodman formulated a taxonomy of the major symbol systems utilized by human beings [5]. Included in his discussion was a description of those symbol systems of special importance in the arts (e.g. musical, poetic, gestural, visual–graphic) as well as the modes of symbolization which they embodied (e.g. representation, expression, metaphor, multiple meanings).

Though Goodman's own work was primarily philosophical in nature, he soon attracted around him investigators interested in the psychological and educational aspects of his 'theory of symbols.' During the first years of the project, much of the work involved interdisciplinary discussion and analysis of major concepts and processes in the arts. The point of view adopted was unflinchingly 'cognitive.' That is, whatever else they may be, artistic activities are seen as occasions for mental activities, some shared with other pursuits (e.g. attention to detail), others of special moments in the arts (e.g. sensitivity to compositional patterns). One who would traffic in the arts must become able to 'read' and to 'write' the symbol systems featured in the arts. An artistic 'reader' can discriminate diverse styles in music or discern the allegoric content of a poem or novel. An artistic 'writer' is able to use abstract forms and colours to suggest elegaic or triumphant moods; or to vary musical phrases so as to create the impression of different seasons or psychological states.

In the wake of the pervasive cognitive revolution [6], it may be difficult to appreciate that this point of view was distinctly iconoclastic in its time. Especially among lay individuals, but also evident among art educators and theorists, was the belief that the arts were primarily a realm of emotion, mystery, magic, or intuition. Cognition was associated with science and problem-solving, not with the creativity needed to fashion and appreciate artistic masterpieces. And even those who had some sympathy with a cognitive approach questioned whether an analysis in terms of 'those little things' called symbols could be productive. Nowadays, however, the battle has been largely won; those who would question the cognitive dimensions of the arts are themselves in a minority.

In the 1970s, under the co-direction of David Perkins and myself, Project Zero became more fully devoted to psychological issues. Perkins directed a 'Cognitive Skills Group' with a primary interest in the perceptual and cognitive capacities of adults; I directed a 'Developmental Group' which focused on the development of symbol-using skills in normal and gifted children. In the present decade, these psychologically-based investigations continue but the Project has also taken a firm educational turn. Well over half of the studies in which we are currently engaged involve more-or-less direct efforts to apply our analyses and insights to programmes in schools, ranging from the pre-school to the college level. *Arts Propel* exemplifies this shift from philosophical analysis and psychological experimentation to practical efforts in educational settings.

Project Zero has involved well over 100 researchers in the past two decades and these individuals have made contributions in a variety of corners of the humanities and social sciences. Our collective work has been reviewed in a number of summary publications [7]. It is therefore not necessary to review our principal research findings here. But it is appropriate to introduce those lines of analysis within the Development Group which have led most directly to the *Arts Propel* undertaking. In early work, we adapted the pathbreaking methods of investigation devised by Jean Piaget [8] in his study of children to the kinds of symbol-using competence which had been described by Goodman. This focus eventually gave rise to three principal lines of investigation. First of all, we carried out cross-sectional experimental studies of specific capacities (like style sensitivity or metaphoric competence) in order to determine the 'natural' developmental trajectory of these important skills [9]. Second, we carried out naturalistic longitudinal studies of the development in early childhood of various kinds of symbol-using capacities [10]. Third, in a scientifically-related body of work, we investigated the breakdown under conditions of brain damage of the very symbolic skills whose ontogenesis we had being probing [11]. A number of important and sometimes unexpected findings emerged from these studies undertaken principally during the 1970s:

1 In most areas of development, children simply improve with age. In several artistic spheres, however, evidence suggests a surprisingly high level of competence in young children, followed by a possible decline during the years of middle childhood. This jagged or 'U-shaped' curve in development is particularly evident

in certain areas of artistic production, though it can perhaps be manifest as well in selective areas of perception [12].

2 Notwithstanding certain deficiencies in their performance, preschool children acquire a tremendous amount of knowledge about and competence in the arts. As is the case with natural language, this acquisition can occur without explicit tutelage on the part of parents or teachers. The evolution of children's drawings constitutes a particularly vivid example of this self-generated learning and development [13]. In this respect artistic learning stands in sharp contrast to most traditional school subjects.

3 In nearly every area, an individual's perceptual or comprehension capacities develop well in advance of productive capacities. Once again, however, the picture in the arts proves far more complex, and at least in some domains, comprehension actually appears to lag behind performance or production capacities [14]. This finding underscores the importance of giving young children ample opportunity to learn by performing, making, or 'doing'.

4 According to classical developmental theory, children's competence in one cognitive sphere should predict the child's level of competence in other spheres as well. Along with other investigators, we discovered much less synchrony across areas. Indeed, it was entirely normal for children to be strong in one or two areas while being average or below average in their attainment in other areas [15].

5 It has been thought for some decades that the brain was 'equipotential', with each area capable of sub-serving the range of human capacities. Neuropsychological research called this finding into severe doubt. A better description indicates that specific areas of the cortex have particular cognitive foci, and that, particularly after early childhood, there is little 'plasticity' in the representation of cognitive capacities in the nervous system [16].

It would be misleading to suggest that we now understand artistic development, even to the same extent that researchers have illuminated scientific development or the development of linguistic competence. As our taunting 'zero' reminds us, research on this topic is still in its infancy. Our work has established that artistic development is complex and multi-vocal; generalizations are hard to come by and often fall by the way. Still, it has been important for us to try to tie together our major findings about artistic development and this we have attempted in a number of places [17].

The theory of multiple intelligences

In my own work, these various insights came together particularly in the so-called 'theory of multiple intelligences' [18]. I claim that, as a species, human beings have evolved over the millenia to be able to carry out at least seven different forms of knowing or 'information-processing.' These include forms of intelligence which deal with language; logic and mathematics; music; spatial information; bodily-kinaesthetic information; knowledge about other persons (interpersonal); and knowledge about oneself (intrapersonal). All normal human beings possess some capacity in each of these intellectual spheres; but as a result of genetic and environmental factors, and as a particular consequence of genetic–environmental interaction, we differ markedly from one another in our profiles of intelligences.

The question immediately arises about whether there is a separate artistic intelligence. According to my analysis, there is not [19]. Rather, each of these forms of intelligence can be directed towards artistic ends: that is, the symbols entailed in that form of knowledge may, but need not, be marshalled in an aesthetic fashion. Thus, linguistic intelligence can be used in ordinary conversation or for the purpose of authoring legal briefs; in neither case is language being employed aesthetically. The same intelligence can be used for writing poems or novels, in which case it is being deployed aesthetically. By the same token, spatial intelligence can be used by sailors or sculptors, even as bodily-kinaesthetic intelligence can be exploited by dancers, mimers, athletes, or surgeons. Even musical intelligence can be used non-aesthetically (as in a communication system based on bugle calls), just as logical-mathematical intelligence can be directed in an aesthetic vein (as when one proof is deemed more elegant than another). Whether an intelligence is mobilized for aesthetic or non-aesthetic ends turns out to be an individual or a cultural decision.

The theory of multiple intelligences was designed primarily for two purposes: 1, to synthesize a diverse set of findings about human cognition into a form which made neurobiological and cultural sense; and 2, to provide a way of thinking which contrasts with the widespread belief in a single intelligence, which can be adequately assessed by paper-and-pencil 'intelligence tests'. It was not conceived of initially as a contribution to education. Yet, for a number of reasons, it has proved attractive to educators and there are now several attempts underway to design educational programmes in the light of this particular view of the human mind [20].

Alternative accents in arts education

Over the course of history, human intelligences have been trained primarily in one of two contrasting ways. On the one hand, individuals have become participants from an early age in activities which mobilize and canalize their intelligence. This process occurs in traditional *apprenticeships* as well as in those informal scholastic activities which feature observation, demonstration, and coaching-in-context [21]. On the other hand, human intelligences have also been trained in more *formal scholastic settings* and formats. Here students attend lectures on various subject matters and are expected to master what they hear; or they read textbooks about these subject matters. They are then expected to memorize and understand this material and to draw on it for homework, examinations, and 'later life'.

According to my analysis, the scholastic approach has come to dominate our thinking about learning and to exercise a near-stranglehold over activities featured in school. Yet individuals can also train intelligences—including a much wider band of their intelligences—through informal or non-scholastic training regimens.

In few areas of knowledge has the distinction between these two forms been more salient than in the field of arts education. For hundreds if not thousands of years, students have learned much of artistry through apprenticeships; they observe artistic masters at work; they are gradually drawn into these activities; they at first participate in simple, carefully-supported ways, and then gradually tackle more difficult assignments, with lessened support from their coach or master. Certainly this was the procedure of choice in the *ateliers* of the Renaissance, and versions of it have persisted in private art and music lessons until this day. Recent 'Artists-in-the-Schools' programmes are efforts to exploit the power of these traditional learning schemes, where appropriate intelligences are mobilized directly, without the need for extensive linguistic, logical, or notational interventions.

Over the last few hundred years, however, a 'second front' has opened in the area of arts education. With the emergence of fields like art history, art criticism, aesthetics, communications, semiotics, and the like, an ensemble of scholastic understandings about the arts has gained importance in the academy. Rather than being acquired through observation, demonstration, or apprenticeship, however, these 'peri-artistic' bodies of knowledge are mastered primarily through traditional scholastic methods: through lecturing, reading, writing, in the same manner as history, economics, or sociology. Now there is no necessary link between these aspects of the arts and the modes of teaching. Art history could be taught through observation or demonstration, even as painting or fiddling could be taught (if not learned!) through lecturing or reading a textbook. And yet, for evident reasons, each of these artistic disciplines has tended to favour one form of pedagogy over its rival.

The current scene in arts education

Various surveys of American education undertaken in the past decade or so paint a generally consistent picture. At the younger grades, arts education is close to universal. More often than not, artistic instruction is provided by the regular classroom teacher and, in general, it focuses very much on artistic production. Children paint, draw, model clay, even as they sing, participate in rhythm bands, or, less often, play an instrument, dance, or tell stories. When teachers are gifted and/or inspired, these productions may achieve a high level, but for the most part the artistic productions are not noteworthy. With the advent of middle childhood, arts education declines in frequency; by high school, specialists handle instruction but only a minority of students participate. With few exceptions the accent continues to fall on production. The actual classroom procedures often involve apprenticeship methods, particularly at the older age levels, but not infrequently the initiative for production is placed almost entirely in the students' hands.

In a few school systems, efforts have been made to train children in 'peri-artistic' activities like history or connoisseurship. Traditionally there has been little constituency in the community for this activity; only with the advent of the Getty Trust, and parallel bodies, has there been a wider call for training in artistry outside the production sphere. Within the professions of arts education, however, a consensus has emerged over the last decades that 'production alone' will not suffice. While arts educators differ in their assessment of the importance of artistic production—and its putative connection to creativity, more broadly framed—they concur that, for the majority of the population, such an exclusive emphasis no longer makes sense. Thus, nearly all of the reform efforts cited above call for an arts education which encompasses some discussion and analysis of art works themselves and some appreciation of the cultural contexts in which art works are fashioned.

The Project Zero approach to art education

Given our cognitive approach to artistic education, these general trends have been applauded within Project Zero. We believe that students need to be introduced to the ways of thinking exhibited by individuals involved in the arts: by practising artists and by those who analyze, criticize, and investigate the cultural contexts of art objects. Yet, in contrast to some advocates of 'discipline-based arts education,' we introduce a number of nuances in our position. These points have led us to put forth our own approach to education in the various art forms. While not pretending to speak for all of Project Zero—past or present—I would call attention to the following points:

1 Particularly at younger ages (below, say, ten), production activities ought to be central in any art form. Children learn best when they are actively involved in their subject matter; they want to have the opportunity to work directly with materials and media; and in the arts, these strengths and inclinations almost always translate into the making of something. Moreover, young children have considerable gifts for figuring the crucial components or patterns in an artistic object and they should have the opportunity to do such 'ferreting out' on their own [22]. This accent is the legacy of the progressive era which deserves to endure, even in a more 'disciplinary epoch' [23].

2 Perceptual, historical, critical and other 'peri-artistic' activities should be closely related to, and (whenever possible) emerge from, the child's own productions. That is, rather than being introduced in an alien context to art objects made by others, children should encounter such objects in relation to the particular artistic products and problems with which they are themselves

engaged—and whenever possible, in intimate connection to the child's own art objects. (Older students and adults can also benefit from such contextualized introductions to peri-artistic activities).

3 Arts curricula need to be presented by teachers or other individuals with a deep knowledge of how to 'think' in an artistic medium. If the area is music, the teacher must be able to 'think musically'—and not merely introduce music via language or logic. By the same token, education in the visual arts must occur at the hand—and through the eyes—of an individual who can 'think visually or spatially' [24]. To the extent that teachers do not already possess these skills, they ought to enrol in training regimens which can develop these cognitive capacities.

4 Whenever possible, artistic learning should be organized around meaningful projects, which are carried out over a significant period of time, and allow ample opportunity for feedback, discussion, and reflection. Such projects are likely to interest students, to motivate them, to encourage them to develop skills; and they may exert a long-term impact on the students' competence and understanding. As much as possible 'one-shot' learning experiences should be spurned.

5 In most artistic areas, it will not be profitable to plan a Kindergarten to Grade 12 sequential curriculum. (I have in mind here undemanding but all too frequent curricular goals: can provide four colour-names; can sing three intervals; can recite two sonnets.) Such a formula may sound attractive but it flies in the face of the holistic, contextually-sensitive manner in which individuals customarily gain mastery in crafts or disciplines. Artistry involves a continuing exposure, at various developmental levels, to certain core concepts, like style, composition, or genre; and to certain recurrent problems, like performing a passage with feeling or creating a powerful artistic image. Curricula need to be rooted in this 'spiral' aspect of artistic learning. A curriculum may be sequential in the sense that it revisits concepts and problems in an increasingly sophisticated way, but not in the same sense that there exists one set of problems, concepts, or terms at grade two, another set at grades three or four.

6 Assessment of learning is crucial in the arts. The success of an arts programme cannot be asserted or taken on faith. However, assessments must respect the particular intelligences involved—musical skill must be assessed through musical means, and not via the 'screens' of language or logic. And assessment must probe those abilities and concepts which are most central to the arts. Rather than crafting the curriculum to suit the assessment, we must devise assessments which do justice to what is most pivotal in an art form.

7 Artistic learning does not merely entail the mastery of a set of skills or concepts. The arts are also deeply personal areas, where students encounter their own feelings as well as those of other individuals. Students need educational vehicles which allow them such exploration; they must see that personal reflection is a respected and important activity; and their privacy should not be violated.

8 In general, it is risky—and in any case, it is unnecessary—to teach artistic taste or value judgments directly. However, it is important for students to understand that the arts are permeated by issues of taste and value which matter to anyone who is seriously engaged in the arts. These issues are best conveyed through contact with individuals who do care about these issues, who are willing to introduce and defend their values, but who are open to discussion and who countenance alternative points of view.

9 Art education is too important to be left to any one group, even that group designated as 'art educators.' Rather, art education needs to be a cooperative enterprise involving artists, teachers, administrators, researchers, and the students themselves.

10 While ideally all students would study all art forms, this is not a practical option. There are simply too many subjects—and, in my terms, too many intelligences—competing for attention on the calendar and the school day is already excessively fragmented. In my view no art form has any intrinsic priority over others. Thus, at the risk of offending many visual art educators, I assert that students should all have extended exposure to some art form, but that it need not be one of the visual arts. Indeed, I would rather have an individual well-versed in music, dance, *or* drama than one with a smattering of knowledge across the several lively arts. The former student will at least know what it is like to 'think' in an art form and will retain the option of assimilating other arts forms in later life; the latter individual seems consigned to remain a dilettante.

Arts Propel

The above points could give rise to any number of programmes in arts education. In the present instance, they have contributed to a new approach called *Arts Propel.* In 1985, with encouragement and support from the Arts and Humanities Division of the Rockefeller Foundation, Harvard Project Zero joined forces with the Educational Testing Service and the Pittsburgh Public Schools. The goal of the resulting multi-year project has been to devise a set of assessment instruments which can document artistic learning during the later elementary and high school years [25].

As anyone involved in educational experiments can readily appreciate, it has proved easier to state, than to implement, our one-sentence goal. We began by attempting to delineate the kinds of competence which we sought to measure in our students. We decided to work in three art forms—music, visual art, and imaginative writing. And we decided to look at three kinds of competences; PRODUCTION (composing or performing music; painting or drawing; engaging in imaginative or 'creative' writing); PERCEPTION (effecting distinctions or discriminations within an art form—'thinking' artistically); REFLECTION (stepping back from one's own perceptions or productions, or those of other artists, and seeking to understand the goals, methods, difficulties, and effects achieved). PROPEL captures acronymically this trio of competences in our three art forms, with the final L emphasizing our concern with LEARNING.

Ideally, we would have liked simply to devise adequate assessment instruments and administer them to students in the target age groups. However, we soon arrived at a simple but crucial truth: there is no point in assessing competences or even potentials unless the student has had some significant experience in working directly with relevant artistic media. Just as baseball scouts look at students who are already playing baseball, it is necessary for educational assessors to examine students who are already engaged in artistic activities. And just as baseball rookies need well-trained and skilled coaches, so, too, art students require teachers who are fully acquainted with the goals of an educational programme and able to exemplify the requisite artistic skills and understandings.

To bring about these goals, therefore, we have selected to devise curriculum modules and link these to assessment instruments. We have implemented a careful procedure of curriculum-and-assessment development. In each art form we have assembled an interdisciplinary team, which together defines the central competences in an art form. In writing, we are looking at students' capacities to create instances of different genres—writing a poem, creating dialogue for a play. In music, we are examining the ways in which students learn from rehearsals of a work-in-progress. And in the area of visual arts (from which I will draw most of my examples here), these competences include sensitivity to style, appreciation of various compositions' patterns, and the ability to create a work which satisfies certain constraints.

Two educational vehicles

For each of these nominated competences, we then generate a set of exercises called a 'domain project'—a set which must feature perceptual, productive, *and* reflective elements. Domain projects do not in themselves constitute an entire curriculum but they must be curriculum-compatible: that is, they should fit comfortably into a standard art curriculum. The domain projects are first explored and critiqued by teachers. Following revision, they are administered in pilot form to students. A preliminary assessment system is then tried out by the teachers. An iterative process is involved until the domain project is considered adequate from the perspective of each of its audiences. Once the project has been completed, it can be used 'as is' by teachers or adapted in various ways to fit a particular curriculum or the teaching style or goals of a specific teacher. Part of the assessment procedure is rough-and-ready—simply giving students and teachers a feeling for what the student is learning. However, it is also possible to make more fine-grained analyses (for research purposes), even as it is possible to produce a summary score for use by the central school administration.

As one example, let me briefly describe the 'composition' domain project, which has already been used quite widely in *Arts*

Propel. This project is designed to help students notice how arrangements and interrelationships of shapes affect the composition and the impact of artistic works. Students are given an opportunity to make compositional decisions and to reflect on the effects of such decisions in their works and in works created by acknowledged artistic masters. In an initial session, students are given a set of ten odd black geometric shapes. They are asked simply to drop those shapes on a piece of white paper. The exercise is then repeated except that on the second trial students are asked to put together a set of shapes which they find pleasing. They are then asked to reflect on the differences between the 'random' and the 'deliberate' work. In a notebook they record the difference which they see and state the reasons which motivated their own 'deliberate' choices. Most students find this exercise fun, though at first they do not quite know what to make of it.

In a second session, students encounter informally certain principles of composition. The teacher introduces the students to a number of artistic works of different styles and periods which differ significantly from one another in the kinds of symmetry or balance which they epitomize or violate. Students are asked to describe the differences among these works as they appear to them and to develop a vocabulary which can capture these differences and convey them effectively to others. Achievements (or violations) of harmony, cohesion, repetition, dominant forces, radial patterns, surprise, or tension are noted. At the conclusion of the session, students are asked to jot down in a notebook similarities and differences in contrasting sets of slides. They are also given an assignment. During the next week, they should search in their daily environment for instances of different compositions—both those compositions already achieved by an artist and those which they can themselves create by 'framing' a scene in nature.

In a third session, students report on the 'compositions' they observed in their own environment and discuss them with reference to those observed in the art classes. The students then return to the deliberate composition of session 1. Now they are asked to make a 'final work'. Before proceeding, however, they are asked to indicate their plans for this work. Then they go about realizing, and, if they wish, revising their final composition. On a work sheet they indicate what they found most surprising about their composition and what further changes they might want to make in a future work.

In addition to the students' own compositions, perceptual discriminations, and reflections, the teacher also has his or her own assessment sheet. There the teacher can evaluate the student in terms of the kinds of compositions attempted or achieved. Other kinds of learning—for instance, the student's success in discovering interesting compositions in his environment or his ability to connect his own compositions with those of well-known artists—can also be assessed. This domain project can be repeated, in its initial or in altered form, to determine the extent to which the student's grasp of compositional issues has developed over time.

The 'composition' domain project works with a traditional element of the visual arts—the arrangement of form—and seeks to tie this element to the students' own productive and perceptual experiences. A quite different approach is taken in a second domain project currently under development called 'The biography of a work.' In this instance our goals are much broader. Indeed, we want to help students synthesize their learning from previous domain projects in composition, style, and expression; and to do so through tracing the development of a complete work.

In this domain project the students are asked to draw their room at home in a way that expresses something about themselves. They are given a range of media (paper, pencil, charcoal, pen and ink etc.) as well as some pictorial material like magazines and slides. In the first session students are asked to choose any element(s) of their room and to add whatever props or objects might be revealing about themselves. They are asked to use these in preparing a preliminary sketch. Their focus should fall on composition but they are encouraged to think about how the range of artistic elements can express *themselves* and not just what is represented literally in the picture. A few samples are given of how aspects of form can convey metaphorically a property of an individual.

In the second session, students begin by examining slides that show how artists have used objects metaphorically in their work and also how particular objects or elements can carry a multiplicity of meanings. They are also shown slides of artists' studios or rooms and asked how these rooms might bring out something about the artists' view of their particular world. Students then return to their own preliminary sketches and are asked to make provisional decisions about the media which they wish to use and the style, colour, line, texture etc. they plan to employ. As in the earlier session, students fill out worksheets in which they are asked to reflect on the choices they have made, the reasons for them, and their aesthetic consequences.

In the third session, students review all of their preliminary sketches and 'trial sheets', think about whether they are satisfied with them, and then begin their final work. Students discuss their works-in-progress with other students. Then, in a final session during the following week, the students complete their works, critique one another's efforts, and review their sketches, trial sheets, and reflections. The activities in this final week serve as a model for the kinds of reflections which are used as well in the student portfolio compilations (see below).

It is our aim in *Arts Propel* to create an ensemble of domain projects for each art form. These prototypes should encompass most of the important concepts in an art form. We hope as well that we can develop a *general theory* of domain projects: what set of exercises qualifies as a domain project, what kinds of learning can one expect to take place, how best can the student be assessed within and across domain projects.

In addition to the ensemble of domain projects, we have also introduced a second educational vehicle—the portfolio (which I have sometimes called the 'process-folio'). Most artists' portfolios contain only the very best works by an artist, the set by which the artist would wish to be judged in a competition. In contrast, our portfolios are much more like 'works in progress.' In their portfolios, students include not just finished works but also original sketches, interim drafts, critiques by themselves and others, art works by others which they admire or dislike and which bear in some way on the current project. Students are sometimes asked to present the whole folder of materials; at other times they are asked to select only those pieces which appear particularly informative or pivotal in their own development [26].

Though the assessment of domain projects is by no means simple, it at least bears a family resemblance to other kinds of assessments routinely carried out by educators and psychologists. When it comes to the assessment of portfolios—and particularly ones which focus on the processes of learning rather than on the quality of the final products—we are inviting unknown territory in the schools. It is too soon to say whether we will be able to achieve the standard psychometric goals of 'reliability' and 'construct validity.'

Nonetheless we have isolated some areas which we are beginning to examine systematically. We plan to evaluate such components as the individual features (or personal profile) of the student's output; his or her ability to conceptualize and carry out a project; the inclusion of historical and critical materials which are related to, or which help to explicate, the student's own work; the regularity, relevance, and precision of portfolio entries; the capacity to think directly in an artistic medium (e.g. by systematically varying one aspect of a work in order to monitor the effect of such manipulation); signs of development and linkage from one work, or set of works, to another; the student's own sensitivity to his or her development; the ability to express personal meanings and to give them some kind of universal form. We realize that it will not be easy to judge each of these dimensions in an objective way; but even an attempt to monitor their initial inclusion, and their development across years, seems worthwhile.

Even if we should fall short of our goal of adequate psychometric measures of portfolios, our effort may still have utility. As noted above, an important aspect of artistic learning is the opportunity to become involved in meaningful projects, in which one's own understanding and growth can come to the fore. It is already clear to us that both students and teachers find these portfolio activities engaging, exciting, and useful in their own right. Their classrooms come alive. By encouraging the development of portfolios, and by looking at them sympathetically and systematically, we may be able to increase the use of these materials and activities in schools. While it may be too much to expect that colleges will ever base admissions decisions chiefly on such portfolio information, we hope that such educational vehicles may allow students to put forth their own cognitive strengths.

Conclusion

Educators and educational critics frequently lament the gap between theory and practice—and between theories and practitioners. It is no doubt true that the professional goals of the two groups *are* different—that the theorist's triumph often leaves the practitioner untouched; while the practitioner's pleasures seem uninteresting to the theorist. For some time, it was fashionable to criticize Project Zero for its remoteness from educational practice. Remoteness in two senses: 1, our work focused more on 'natural' development than on what could be explicitly taught in the classroom; 2, our ideas, whether or not they were considered generally appealing, had little or no direct implications for what happened in the classroom on Monday morning.

While these charges sometimes left us a bit offended and made us a shade defensive, we are on the whole comfortable with them. We feel that it is important to look at 'natural' development before one examines interventions; and we believe that it is important to establish the psychological facts and to develop one's educational philosophy before one attempts to influence practice—especially since it is always possible that one might influence practice for the worse!

Having had the luxury of two decades of relatively 'ivory tower' exploration in arts education, it is certainly opportune for us to become more directly involved in educational experimentation. The fact that this is a time in which arts educational practice is being so widely discussed only heightens the need for us to 'get our hands wet.' *Arts Propel* represents one concerted effort to do just that. It is too early to know how successful this effort will prove to be; and even if successful in its 'hot-house' atmosphere, whether it can be successfully transported to more remote soils. But it is not premature to indicate that researchers can learn a great deal from attempting to implement their ideas in a school setting. So long as we are on the alert for any disruption that we may cause, this intermingling of theory and practice should redound to the good of all those involved in arts education.

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Notes and references

1 For a sampling of differing views see: (i) Burton, J., Lederman, A. & London, P. (eds) (1988) *Beyond DBAE: the Case for Multiple Visions of Art Education.* University Council on Art Education; (ii) Dobbs, S. (ed) (1983) *Research Readings for Discipline-Based Art Education: a Journey beyond Creating.* Reston, Virginia, National Art Education Association; (iii) Eisner, E, (1987) *The Role of Discipline-Based Art Education in America's Schools.* Los Angeles, the Getty Center for Education in the Arts; (iv) Ewens, T. (1988) *Flawed Understandings: on Getty, Eisner and DBAE.* (in Burton *et al* above, pp. 6–25); (v) The Getty Center for Education in the Arts (1986) *Beyond Creating: the Place for Art in American Schools*; (vi) Jackson, P. (1987) Mainstreaming art: an essay on discipline-based art education; *Educational Researcher* **16,** 39–43; (vii) Zessoules, R., Wolf, D.P. & Gardner, H. (1988) *A Better Balance* (in Burton *et al* above, pp. 17–30).

2 Buchler, J. (ed) (1940) *Philosophical Writings of C.S. Pierce.* London, Routledge & Kegan Paul.

3 Cassirer, E. (1953–7) *The Philosophy of Symbolic Forms.* New Haven, Yale University Press.

4 Langer, S.K. (1942) *Philosophy in a New Key.* Cambridge Mass., Harvard University Press.

5 Goodman, N. (1976) *Languages of Art.* Indianapolis, Hackett.
Goodman, N. (1978) *Ways of Worldmaking.* Indianapolis, Hackett.

6 Gardner, H. (1985) *The Mind's New Science.* New York, Basic Books.

7 See (i) Gardner, H. (1982) *Art, Mind and Brain.* New York, Basic Books; (ii) Goodman, N., Perkins, D. & Gardner, H. (1972) *Summary Report: Harvard Project Zero* (available as Technical Report from Harvard Project Zero); (iii) Perkins, D. & Leondar, B. (1977) *The Arts and Cognition.* Baltimore, Johns Hopkins University Press; (iv) Winner, E. (1982) *Invented Worlds.* Cambridge, Mass., Harvard University Press; (v) Gardner, H. & Perkins, D. (eds) (1988) Art, Mind and Education: *Journal of Aesthetic Education [Special Issue on Harvard Project Zero],* **22,** No 1.

8 Piaget, J. (1979) Piaget's Theory; in: Mussen, P. (ed) *Carmichael's Manual of Child Psychology.* New York, Wiley.

9 Gardner (1982), *ibid* n. 7.

10 See (i) Wolf, D. & Gardner, H. (1981) On the structure of early symbolization; in: Schiefelbusch, R. & Bricker, D. (eds) *Early Language: Acquisition and Intervention.* Baltimore, University Park Press; (ii) Wolf, D., Davidson, L., Davis, M., Walters, J., Hodges, M. & Scripp, L. (1988) Beyond A, B and C: a broader and deeper view of literacy; in: Pelligrini, A. (ed) *Psychological Bases of Early Education.* Chichester, Wiley.

11 See (i) Gardner, H. (1975) *The Shattered Mind.* New York, Knopf; (ii) Kaplan, J.A. & Gardner, H. (1989) Artistry after Unilateral Brain Disease; in: Boller, F. & Graffman, J. (eds) *Handbook of Neuropsychology,* Vol 2. Elsevier, New York.

12 Gardner, H. & Winner, E. (1982) First Intimations of Artistry; in: Strauss, S. (ed) *U-Shaped Behavioral Growth.* New York, Wiley.

13 Gardner, H. (1980) *Artful Scribbles.* New York, Basic Books.

14 Winner, E., Blank, P., Massey, C. & Gardner, H. (1983) Children's sensitivity to aesthetic properties of line drawings; in: Rogers, D.R. & Sloboda, J.A. (eds) *The Acquisition of Symbolic Skills.* London, Plenum Press.

15 See (i) Gardner, H. (1983) *Frames of Mind.* New York, Basic Books; (ii) Winner, E., Rosenblatt, E., Windmueller, G., Davidson, L. & Gardner, H. (1986) Children's perception of 'aesthetic' properties of

the arts: domain specific or pan artistic? *British Journal of Developmental Psychology*, 4, 149–60.

16 See (i) Gardner (1975) *ibid* n. 11; (ii) Gardner, H. (1986) Notes on cognitive development: recent trends, future prospects; in: Friedman, S., Klivington, K. & Peterson, R. (eds) *The Brain, Cognition and Education.* New York, Academic Press.

17 See (i) Gardner, H. (1973) *The Arts and Human Development.* New York, Wiley; (ii) Winner (1982) *ibid* n. 7; (iii) Wolf, D. & Gardner, H. (1980) Beyond playing or polishing: the development of artistry; in: Hausman, J. (ed) *The Arts and the Schools.* New York, McGraw Hill.

18 Gardner *Frames of Mind, ibid* n. 15.

19 Gardner, H. (1983) Artistic intelligence; in: Dobbs (1983) *ibid* n. 1.

20 Gardner, H. (1988) Assessment in context: the alternative to standardized testing (in press); Gardner, H. (1989) The school and the future (in press).

21 See (i) Brown, J.S. & Collins, A. (1988) Cognitive apprenticeship and social interaction; paper presented at the American Educational Research Association, New Orleans, April 1988; (ii) Gardner (1988) *ibid* n. 20; (iii) Resnick, L. (1987) Learning in school and out; *Educational Researcher*, Dec, pp. 13–19; (iv) Schon, D. (1984) *The Reflective Practitioner.* New York, Basic Books.

22 Bamberger, J. (1982) Revisiting children's drawings of simple rhythms: a function for reflection-in-action; in: Strauss (1982) *ibid* n. 12.

23 *Cf* Dewey, J. (1958) *Art as Experience.* New York, Capricorn *and* Lowenfeld, V. (1947) *Creative and Mental Growth.* New York, Macmillan.

24 *Cf* Arnheim, R. (1969) *Visual Thinking.* Berkeley, University of California Press.

25 I should like to stress that the ideas of *Arts Propel* have been worked out in collaboration with the partners named in this paragraph.

26 *Cf* (i) Brown, N. (1987) Pivotal points in artistic growth; presentation at the August 1987 *Arts Propel* Summer Workshop, Pittsburgh; (ii) Wolf, D. (1986) All the pieces that go into it: the multiple stances of arts education; in: Hurtwitz, A. (ed) *Aesthetics in Education: the Missing Dimension.* Mattituck, Maryland, Amercon House; (iii) Wolf, D. (1988) Opening up assessment; *Educational Leadership*, **45**, 24-9; (iv) Wolf, D. (1988) Artistic learning: what and where is it?; *Journal of Aesthetic Education*, **22**, 1, 144–55.